Time

Michael Boduch and Warren Fincher

THE UNIVERSITY OF TEXAS AT AUSTIN
SCHOOL OF ARCHITECTURE

csd
Center for Sustainable Development

Time[1]

Michael Boduch
Warren Fincher

Fig. 01 Is time the clock?

Consider time as a medium. We live our lives within the course of time. Out of time we construct pasts and future, which ultimately lead us to gain a sense of self. We commodify time, making equivalences between lengths of time and quantities of pay. Time is a flow, a place, a rhythm, a quantity, a quality, a commodity. The present discussion investigates the nature of time with a particular emphasis on how we control time. The first section examines the way in which we apprehend time and represent it. Through mechanisms of representation, we come to construct a cultural approach to time. The second half of the discussion explores the mechanisms by which we attempt to control time through knowing it: authoring narrative of the past, hypothesizing predictions of the future, and understanding what the "now" means to us. Throughout, the discussion suggests to the significance of these debates for our relationship with the physical world and our attempts to control it.

The Rationalization of Time

> I always think I know what time is--until the moment I am asked. In any case, our times are measured, whether it be in heartbeats or in new moons.[2]
>
> Saint Augustine
> Confessions

Time and the Clock

Most people understand the concept of time as a linear progression of events, with a sense of place along that continuum signified as "now" or the "present." The sense of now is defined in contrast to past and future. However, reflection on how we measure time uncovers an important debate about the nature of time: whether time is a property of physics that exists independent of the observer or whether time is immanently bound up in the experience of time.

Newton offers the notion of absolute time, perhaps the most broadly held conception of time in Western society. Absolute time is a backdrop for physical events and proceedings to occur; the life of an object begins and ends at specific times without depending on that physical phenomenon to create time. Indeed, time exists independent of all physical substance. Newton writes in Principia:

Absolute, true and mathematical time, of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration. Relative, apparent, and common time, is something sensible and external (whether accurate or unequitable) measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year.[3]

Nothing that stands within the progress of time, within the trajectory of the present into the future, can change the means or rate by which time proceeds.

Immanuel Kant approaches time differently, often in debate with the notions of time offered by Isaac Newton. From Kant's perspective

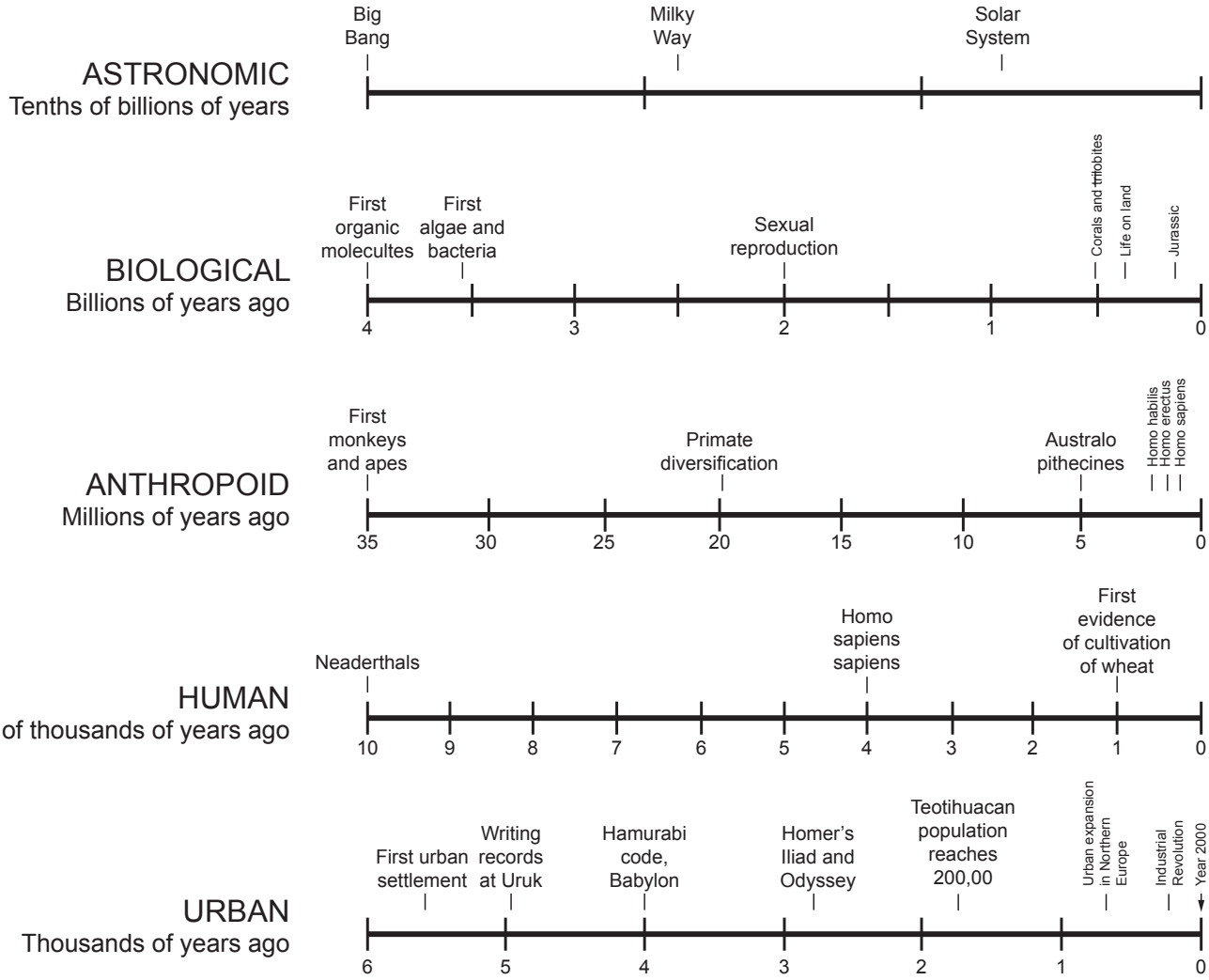

Fig. 02 Time can be measured in different durations

of transcendental idealism, the primary definition of time is as an a priori perception. Kant understands time as being perceived through intuition, the ability to formulate an objective representation, though a representation that is immediate and non-reflective. This way of knowing is distinct from phenomenological sensations, which cannot be cognitively distinct from the subject himself. Intuition is also distinct from conceptualization, in which the concept of a thing is mediated through reflection and the logics of categorization.

> If we try to keep within the framework of what can be proved by the Kantian argument, we can say that it is possible to demonstrate the empirical reality of space and time, that is to say, the objective validity of all spatial and temporal properties in mathematics and physics. But this empirical reality involves transcendental ideality; space and time are forms of human intuition, and they can only be proved valid for things as they appear to us and not for things as they are in themselves.[4]

Time is not something possessed by an object, nor an object in itself, but rather something we come to know through our observations of objects.

The sociologist Norbert Elias observed that the clock holds particular importance in the modern understanding of time, but he warns that the progression of time should not be conflated with the measuring abilities of the clock. Instead he offers that the clock is an instrument by which we may understand the progression of events, and consequently come to place events within systems of causality. The clock, then, serves as a tool in the social organization of time, assisting social entities to coordinate and regulate interactions.[5] Despite recognizing the social nature of measuring out time through clocks, Elias believes time to be a linear and progressive continuum.

Don Ihde reverses Elias' contention that the clock serves to regulate time, and proposes the irrelevancy of Newton's notion of Absolute Time. He makes the post-phenomenological argument that we are unable to create a subject-object relationship between ourselves and our experiences of time. As such, we can only perceive time through mechanisms of measurement. The clock (or, as Saint Augustine offers: heartbeats and moon cycles) creates a signifier of time, a minute or month or year, and creates the signified, the "length" of a minute or a month or a year. "Technologies," Ihde claims, "mediate our way of experiencing the world."[6]

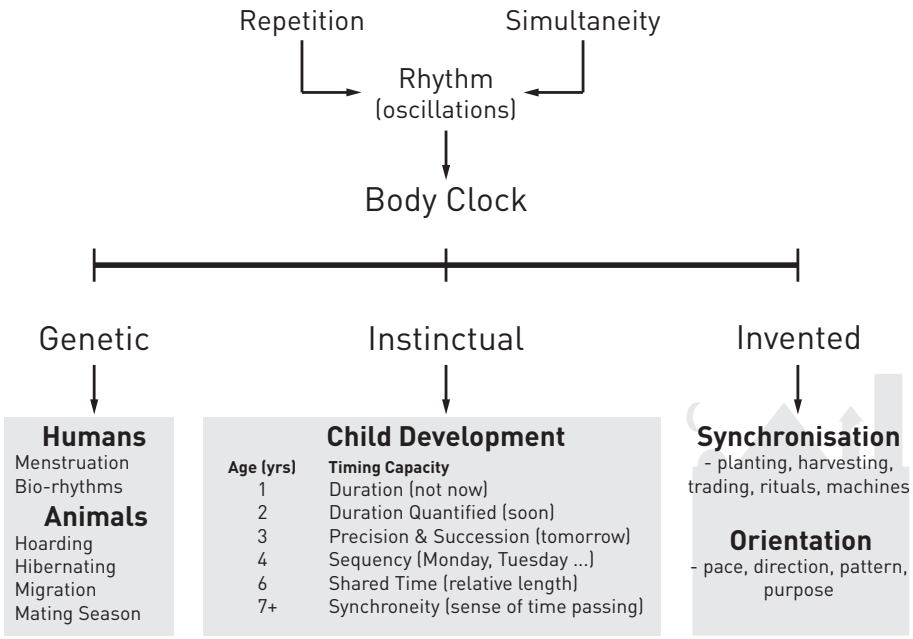

Fig. 03 Time is based on cycles

Indexing Time: Seeing Time Through Its Associations

With the exception of Ihde, the philosophers encountered in the previous discussion conceptualized time as a linear and infinite continuum with a unidirectional orientation to experiencing time. Our ideational organization of time frequently places the parameters of duration onto this limitless continuum and rationalizes sequences of events as cyclical and consequently predictable. On this point, Kevin Lynch writes:

> We have two kinds of evidence of the passage of time. One is

> rhythmic repetition – the heartbeat, breathing, sleeping and waking, hunger, the cycles of the sun and moon, the seasons, waves, tides, clocks. The other is progressive and irreversible change – growth and decay, not recurrence but alteration.[7]

The durations, cycles and equivalencies come to be understood through their social construction based on evidence of time. Indices of time, those markers that time has passed, are signifiers of different time scales and time-based processes.

Durations

Durations – lengths of time – are indexed through changes in the natural and built worlds. Of undeniable salience to the human observer, our bodies also index durations. The implications of the passage from birth to death places humans in an existential reflection about the duration of human life. Childhood, adolescence, adulthood, each of these mark out durations within life, albeit with points of transition often delineated more by rites of passage than set measures of years. Sequences can also index durations. Events like puberty and menopause denote durations within the aging process. And in childhood development, as described by the developmental psychologist Jean Piaget, four stages mark out progress through the duration: sensorimotor, preoperational, concrete operational and formal operational. Thus index of behavioral development and physiological changes creates a sense of linear time on a limited continuum.

Durations provide us with the parameters of time that allow the ability to locate points in time. Many of these can only be inferred through accumulated evidence that time has passed. Astronomic time is evidenced by changes in the astral topography, or more accurately our theories about the scope of cosmic expansion and the changing positions of the stars. In subdividing this duration, scientists find marking out units of ten billion years to be meaningful lengths of time. Biological evolution can be scaled as occurring along a 4 billion year length of time, with billions and hundreds of thousands being the significant subdivisions of time. The duration of anthropoid development is 35 million years; duration of human development over the last 100 thousand years; and urban development extending across six-thousand years. Examining building systems and construction materials, we can also speak of durations in architectural terms, discussed below.

Cycles

In addition to durations, linear conceptions of time with starting and finishing moments, the cycle places durations into repeating sequences that evidence change, eventually returning to a previous point in the cycle and engaging the cycle again. Environmental rotations are easily identified examples: diurnal, lunar, annual. In each of these evidence of repeating processes occur. The daily cycle shows sunflowers turning from East to West, only to repeat again the next day. Temperature and relative humidity will typically cycle such they crest and ebb at relatively predictable points in the day. Annually, seasons mark out cold and hot, rainy and dry, sunny and dark periods in the yearly cycle, with expectations that they will occur again and in the same order the following year.

Not all cycles return to identical starting points. With additive cycles, the processes occurring within each cyclic iteration are the same, but the accumulative effect does not return the cycling element to the same initial state. The cycles of capitalism evidence this. Immanuel Wallerstein, a political economist, theorized that economic processes follow a dialectic cycle that ultimately results in the accumulation of wealth and the expansion of the global capitalist system.[8] He offers a complex system of causality, but essentially Wallerstein follows a Marxist approach to capitalist labor relations in which he roots the cyclical processes within 70-year Kondratieff cycle. These cycles proceed by regular expansion and contraction of the economic cycle, but results in the cyclic increase in wealth and expansion of a worker base due to the inequalities inherent in the worker-owner relationship.

Space and Time Equivalences

The traditional ways we have made time knowable and predictable are increasingly meaningless in modern times. Anthony Giddens argues in *The Consequences of Modernity* that time and space have an equivalency in non-modern social settings. The amount of distance that could be traveled in a day was relatively constant to either the speed of walking, the gait of a horse, or the velocity of a ship. Each of these modes of travel created an correlation between time and

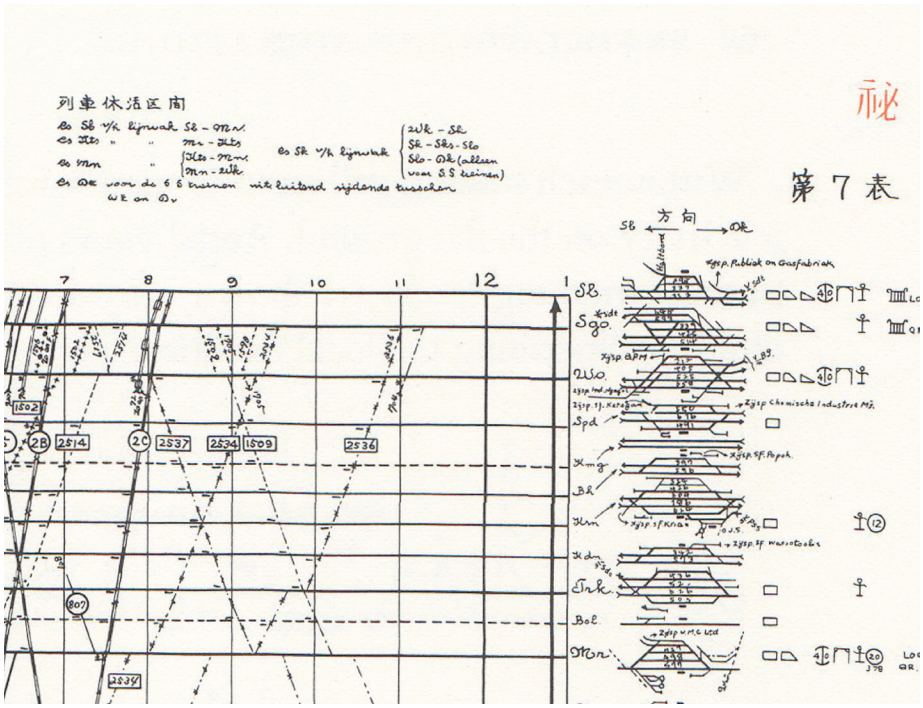

Fig. 04 Early railway timetables

space. Horizons were local, and communication was dependent upon the speed of travel. Thus social interaction occurred within a located and surveyable place.

Giddens asserts that the technologies developed in the modern era urge a substantive reorganization of the relationship between time and space. With the advent of rapid transit and increasingly instant communication, the relationship between time and space have become flexible to a point beyond any non-modern equivalency. The index of time onto distance is disrupted. The consequence of this "time-space distanciation" is not only the dissociation of traditional comparability of time and space, but also the disembedding of social action from specific places by "fostering relations between 'absent' others, locationally distant for any given situation of face-to-face interaction."[9] Ways of living are "lifted out" of their contexts and recombined "across time and space."[10] Disembedding processes result in destruction of place and an emptying of space.

Registering Time: the Clock as Map

The durations and cycles of time need to be meted out for people to manage time in increments smaller that these indices evidence, a task increasingly important for modern social dynamics. In the premodern worlds, different civilizations had different times. Each had its own approach to utilizing the indices of day, season and year. Norbert Elias states that:

> it took several thousand years for people to learn how to produce calendars in which the human representation of time in the symbolic form of recurring time units needed for the regulation of social events, and the natural sequences on which the symbolic representation was modeled, did not sooner or later fall out of step.[11]

As the peoples of different nations began to interact in increasing volume, the inconsistencies between the different metrics of time caused problems for the coordination of international economic and diplomatic interactions.

The clock and the calendar are the two primary means to subdividing the most notable indices of time. This allows us to map out time: create a measurable distance between ourselves and events in the past, coordinate future activities with others, and manage our present with greater precision (as with specific cooking times or the time the whistle blows at the end of the work day.) The clock apportions the observable 24 hour daily sun cycle into discrete and equivalent components, from hours and minutes on the grandfather clock, down to the tenths and hundredths of a second on a stopwatch. The calendar apportions the annual solar cycle, the time it takes our planet to revolve around the earth. While we depend on these ways of marking out time with a sense of regularity, there are some idiosyncrasies that we must note in order to keep our means of mapping

time accurate: the leap year, news that a second needs to be added to our clocks. We further adapt the clock to our social needs: the move from standard to daylight standard time, and the fact that some months have less days than others. Both the clock and the calendar are ways to measure time against physical phenomena, but each is operating at a different scale, and likewise each provides different scales of management and control. For the modern world, the measurement of time has been used to manage the pace of production against the wage of the laborer. Jeremy Rifkin argues that capitalism finds its origins in the commodification of space and materials, but quickly extended this process to the human experience of time.

> The progression in economic priorities from manufacturing goods to providing basic services to commodifying human relationships and finally to selling access to cultural experiences is testimony to the single-minded determination of the commercial sphere to make all relations economic ones.[12]

Leases, partnerships, subscriptions and retainers — all form the backbone of commercial time. In the process cultural time wanes and is replaced by measuring time through economic equivalencies.

The clock and the calendar remain the primary means of representing a progression of time, but it is an empty, abstract time. It may serve the needs of capitalism because it easily lends itself to a wage-based equivalency. But modern society embeds meaning into time in a variety of other ways. Edward Tufte has engaged creative ways of representing time, filling the hour or the year with a sense of movement, speed, and interaction, or representing histories in vivid visual narratives mapped out against the metric of time. His work reminds us that the passage of time is filled with layers of experiences, and our means of representing that complexity requires more than a clock or a calendar.

Time as Present, Future, and Past

Indices and maps of time allow us to locate ourselves in a present moment, situated between an understanding of the past and expectations of the future. We can make attempts to control the ever-emerging present by analyzing trajectories of the past into the present, but doing so requires mediating the gap between our understanding of past events and future possibilities with structural and material constraints. If we can successfully marry our ideas of the meaning of past, present and future events with behavioral strategies, we can engage a praxis that allows us to shape our present – or at least that is the aspiration as inhabitants of modernity.

Present as dialectic of past and future

Our experience of time is largely ideational: memory of the past, perception of the present, expectation of the future. The experience of these three moments of time are not unrelated. The perception of the present is colored by past experiences and judgments, utilizing these frames as meaningful in orienting the actions and interpretations for, as expressed by George Herbert Mead, both the impulsive “I” and the reflective “me.” The present is also interpreted in terms of the anticipation of the future, whether from a rational actor approach to maximizing future benefits or from an interactionalist orientation in which beliefs about the future are used to interpret the present. Kevin Lynch concurs, writing “we preserve present signals for the past or control the present to satisfy our images of the future. Our images of past and future are present images, continuously recreated. The hearts of our sense of time is the sense of ‘now.’”[13]

Past, present and future are often understood in terms of a sequence with the “sense of now” situated medially. The spatialization of past, present and future often comes to play when attempting to describe the nature these three moments. Kant writes, “Of any two regions of space, it must make sense to say that there is a spatial route that could be taken from one to the other. In the case of time, of any two distinct times, it must be true that one is before or after the other.”[14] The boundaries of “before” and “after” become important to Georg Simmel as he attempts to create a theory of the now. With a concern over the maintenance of a present order in the face of a continually changing present, Simmel conceives of the present as being comprised by a dialectic between past and future. “The present, in the strict logical sense of the term, does not encompass more than the absolute ‘unextendedness’ of a moment. It is as little time as

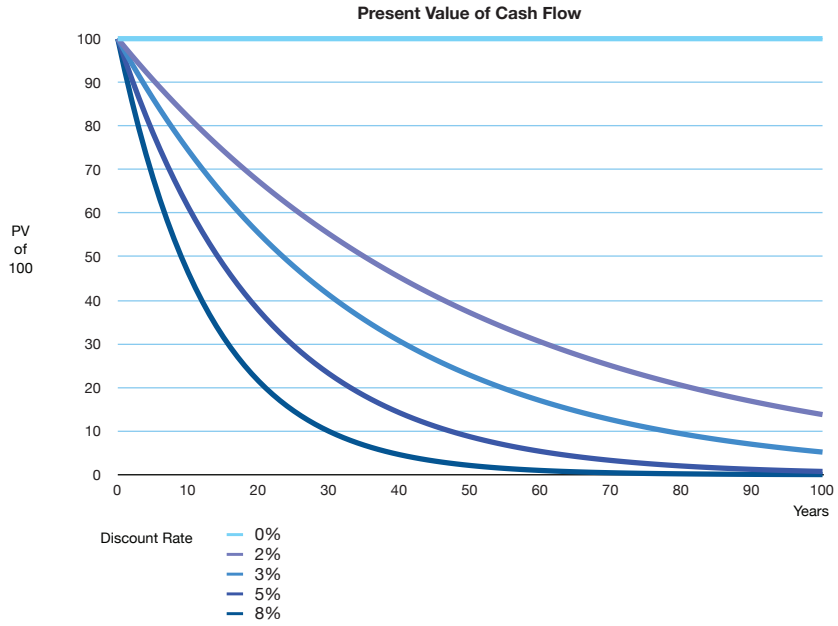

Fig. 05 Present Value of Cash Flows. If the cash flow is too far in the future, it becomes meaningless.

the point is space."[15] The present moment, in this sense, doesn't exist, since it stands between an imminent future moment and the retreat of the present moment into a past. The present "denotes merely the collision of past and future, which two alone make up time of any magnitude, that is real time. But since the one is no longer and the other not yet, reality adheres to the present alone."[16] For Simmel, the present exists between past and future without any duration of its own. Yet while arguing for past, present and future as analytically separate entities, he is willing to concede that our experience of time cobbles together that sense of now as "something real in a temporal dimension."[17]

George Herbert Mead's definition of temporality exhibits some similarities to that of Simmel. To paraphrase, Mead holds that we engage the present through our experience of it, but we participate in the future through ideas. Given this, we can image many alternate futures emerging from the present moment, generally through contrasting the future not only with the present but also with other ideations of the future.[18] The ability to control which of the possible futures comes to pass, we can select the desirable future and then plot the route to that future. Backcasting, then, deploys the conceptual processes involved in the countersystemic analysis of the future as a methodology of the present.

The Future

The events of the future are inherently unknowable, but we can extrapolate from the past in order to create a set of expectations about the future. George Santayana recognizes the role of history in shaping our futures: "those who cannot remember the past are condemned to repeat it."[19] Predicting the future from the past is the basis of forecasting.

Forecasting is a technique that aims to predict the future based on the evidence of the past. It is mathematical. There are a range of methods available to create time-series forecasts, each used to weight certain data points more or less heavily, to give more credence to the recent past, or to correct for seasonality or other effects. One means of testing the forecasting model is to input data from the beginning of a time-series up to, say five years ago, and then evaluate the predictions of the model for those most recent five years against the actual events.

Forecasting is a reliable technique when data has a rhythm and events are stable. However, it is of little use when shocks occur to the system. A variety of methods have been designed, though, to maintain an ability to predict the future. One is scenario analysis, in which a range of experts asked to hypothesize reactions to various situations. Another is the Monte Carlo technique, whereby a simulation is run multiple times, and the results are utilized to create probabilities of the future. These can be adapted to handle certain shocks to the system if they too are given a probability.

These techniques have their roots in economics. However, economics brings its own limitations that we feel on a daily basis. The most limiting is the use of discount rates in determining future values of investments. Most of us have an intuitive concept of interest rates. If

a bank offers an interest rate of 10% and we deposit $100, then after a year we have $110 in the account. The same happens in reverse when we borrow to buy something — this is why when we look at the lifetime of payments we make for a loan on a house it is much more than we would have paid if we had the entire amount in cash at the moment of purchase.

Discount rates use this same approach to determining the values of future cash flows. If I make an investment that will earn $1000 each year, the 1000 I will receive 10 years from now is not worth as much to me as the 1000 dollars will receive after the first year. The difference can be calculated with interest rates, and the discount rate is assumed to be the rate of return one can assume to get from a safe investment.

The problem with this is how it limits our investment horizons. Given a discount rate of 5%, no investment is worth taking if the payback horizon is 100 years or more. Further, even with a 50 year window a future cash flow is worth only 10% of its current value. In a world with many competing demands for money, a clear bias for quick returns develops and infrastructure projects in particular become harder to finance.

Finally, life cycle assessment attempts to embed future costs into present choices. When we buy a piece of material, we don't often pay for all the costs embedded in the product, such as the cost of pollution incurred while transporting the material, the cost of disposing of the material when no longer used, or the cost imposed to cleaning up environmental degradation from the process of production. These costs are called externalities. The premise behind life cycle assessment is to try to calculate not only the environmental impact of consumption but all those externalized costs from extraction to disposal. With this, the sum environmental impact of a product at some future point can be estimated.

The Past

The past is significant in the way we understand the "now" as well as the way we formulate our expectations of the future. We most know the past through memory, whether accurate recollections or not. While our personal memories are confined to the limits of our biography, we can know a past not directly experienced through the collective memory. Just as the past events of a life can frame a sense of self, collective memory serves to create a sense of solidarity among a people.

Collective memory in the modern era can be difficult to maintain. Migration for work, educational opportunities and wanderlust remove people from their homelands. Because collective memory is embodied in the social interactions of a community, these modern developments can weaken the preservation of collective memory. Objects, however, can serve as reminders, keeping form when social interactions weaken, shift or fail. Chorney notes

> A sense of community depends upon a 'collective memory' of the individuals – essentially a merge of their past – something that has been eroded by industrial capitalism and the urban experience. Collective memory requires social interaction that is reinforced by physical elements, without which events fade into obscurity – a kind of social amnesia. [20]

The built environment is one of these markers that allows a people to remember, even when a continuity of memory might otherwise be lost. The built environment is experienced every day as we move through the city, not only phenomenologically but also reflectively, set against the meanings that a community associates with the features of the city. The built environment carries echoes of historical events and the meanings that resulted. An authenticity of the "remembered city" cannot be faked — making something seem historical like the new urbanism of Seaside, Florida does not work. Memories require time. "What we call 'time' is therefore, to begin with, a frame of reference used by people of a particular group, and finally by humankind, to set up milestones recognized by the group within a continuous sequence of changes."[21] Places serve as the backdrop of these sequences of change, and as such, they become the frames of reference. Places can serve as kind of a clock, as we engage the act of reading buildings from different periods and understanding them in relation to the now.

Memory is often most heavily infused in a structure that has stood for generations, such as the Pantheon in Rome. However, cultural memory can also be infused in a building with more transitory materials. The simple wood construction used in the Ise Shrine in Japan might imply that the building only lasts a few

generations. However, it is rebuilt every 20 years so that the building is both new and old, and the memory is embedded in the structure and all the rituals in the intervening years in preparation for the next construction. Collective memory can also be experienced in the absence of a built environment that should be there. This is what will most likely happen with the World Trade Center. Even when a new structure is erected, the collective memory of the old will remain, as it is part and parcel of what it now means to be a New Yorker. Finally, collective memory can be embedded in typologies. The pyramid and obelisk will always remind us of Egypt, and the cruciform plan of Christianity.

As Maurice Halbwachs has stated,

> ... every collective memory unfolds within a spatial framework. Now space is a reality that endures: since our impressions rush by, one after another, and leave nothing behind in the mind, we can understand how we recapture the past only by understanding how it is, in effect, preserved by our physical surroundings. [22]

The physical surroundings are key.

Conculsion: Time and the Built World

There is a correlation between the built world and time, although different equivalencies exist depending on design, material choice and craft. What we build lasts — both the good and the bad. Thankfully, buildings can adapt, and some do quite well. Stewart Brand points out in How Buildings Learn that structure is permanent, but skin is mutable.[23] He also mentions that non-descript buildings such as warehouses and high-intent, high cared for buildings such as a spectacular country house are particularly equally adept at mutation.[24] Even if a building cannot be reused, often its components can. The artifacts of buildings, such as steel girders, can extend past the lifetime of the buildings and reused in others. This is one advantage to simple, assembled building techniques that use prefabricated elements. But as Niklaus Kohler likes to mention, it's the good buildings that really drive our cost down to nothing. Huge expensive buildings can seem tough to justify financially due to the discount rate mentioned earlier, but this argument can be used to advantage — the arena in Nîmes is a classic example of a building that lives so long that even though phenomenally expensive when built its costs have been discounted to nothing over the years. The best building may be the building that is never built. But rather, let's build only what we require, let it be built well or adaptable, and let it be meaningful enough that it adds to our collective memory.

We may use the building stock as an index of time, but also an indicator of what we can expect in the future. The building stock can last a long time – millennia in some cases – or it can wear out in a few decades. The built world can require intense levels of energy and resources to maintain, or it can reduce its consumption. The trends of the past and the actions of the present lead us to certain projections about the future. We understand that there are possibilities for the future: sustained or depleted, salubrious or hazardous. The way we understand time and our ability to control our activities within the medium of time are key to a sustainable future.

Bibliography

Augustine, Saint Aurelius Augustinus. 1975. *Confessions*. R. S. Pine-Coffin, trans. London: Penguin.

Brand, Stewart. 1994. *How Buildings Learn*. New York: Viking.

Chorney, Harold. 1990. *City of Dreams: Social Theory and the Urban Experience*. Toronto: Nelson Thomson Learning.

Giddens, Anthony. 1994. *The Consequences of Modernity*. Stanford: University of California Press.

Giddens, Anthony and Christopher Pierson. 1998. *Conversations with Anthony Giddens: Making Sense of Modernity*. Cambridge: Polity Press.

Halbwachs, Maurice. 1980. *The Collective Memory*. (New York: Harper & Row Colophon Books).

Ihde, Don. *Postphenomenology and Technoscience: The Peking University Lectures*. Albany: SUNY Press.

Kant, Immanuel. 2008. *Critique of Pure Reason*, Revised Edition. Marcus Weigelt, trans. New York: Penguin Classics.

Kreiken, Robert Van. *Norbert Elias*. New York: Routledge.

Lynch, Kevin. 1976. *What Time is This Place?* Cambridge: MIT Press.
Martin, Gottried. 1961. *Kant's*

Metaphysics and Theory of Science. Manchester: Manchester University Press.

Newton, Isaac. 1995. *The Principia*. Andrew Motte, trans. Amherst: Promethus Books.

Rifkin, Jeremy. 2001. *The Age of Access: the New Culture of Hypercapitalism Where All of Life Is a Paid-For Experience*. New York: Tarcher Putnam.

Santayana, George. 1905. *The Life of Reason*, Volume 1 (np).

Simmel, Georg. 1971. *On Individuality and Social Forms*. Donald N. Levine, ed. Chicago: University of Chicago Press.

Sjoberg, Gideon, Elizabeth A. Gill and Leonard D. Cain. 2003. "Countersystem Analysis and the Construction of Alternative Futures," *Sociological Theory* 21(3): 210-235.

Wallerstein, Immanuel. 2001. *The End of the World as We Know It: Social Science for the Twenty-First Century*. Minneapolis: University of Minnesota Press.

Notes

[1]This paper orinates and expands upon in a lecture given by Nicholas Kohler, given September 30, 2009.

[2]Saint Aurelius Augustinus Augustine, *Confessions*, translated R. S. Pine-Coffin, (London: Penguin, 1975) 269.

[3] Sir Isaac Newton, *The Principia*, translated by Andrew Motte (Amherst: Promethus Books, 1995) 6.

[4] Gottried Martin, *Kant's Metaphysics and Theory of Science* (Manchester: Manchester University Press:, 1961) 41.

[5] Robert Van Kreiken, *Norbert Elias* (New York: Routledge, 1998) 26.

[6] Don Ihde, *Postphenomenology and Technoscience: The Peking University Lectures* (Albany: SUNY Press, 2009) 34.

[7] Kevin Lynch, *What Time is This Place?* (Cambridge: MIT Press, 1976) 65.

[8] Immanuel Wallerstein, *The End of the World as We Know It: Social Science for the Twenty-First Century* (Minneapolis: University of Minnesota Press, 2001).

[9] Anthony Giddens, *The Consequences of Modernity* (Stanford: University of California Press, 1990) 18.

[10] Anthony Giddens and Christopher Pierson, *Conversations with Anthony Giddens: Making Sense of Modernity* (Cambridge: Polity Press, 1998) 98.

[11] Norbert Elias, *Time: An Essay* (Oxford: Blackwell Publishers, 1992) 16.

[12] Jeremy Rifkin, *The Age of Access: the New Culture of Hypercapitalism Where All of Life Is a Paid-For Experience* (New York: Tarcher Putnam).

[13] Kevin Lynch, *What Time is This Place?* (Cambridge: MIT Press, 1976) 65.

[14] Immanuel Kant, *Critique of Pure Reason*, Revised Edition, translated by Marcus Weigelt (New York: Penguin Classics, 2008) B37.

[15] Georg Simmel, *On Individuality and Social Forms*, ed. by Donald N. Levine (Chicago: University of Chicago Press, 1971) 359.

[16] Georg Simmel, *On Individuality and Social Forms*, ed. by Donald N. Levine (Chicago: University of Chicago Press, 1971) 359.

[17] Georg Simmel, *On Individuality and Social Forms*, ed. by Donald N. Levine (Chicago: University of Chicago Press, 1971) 359.

[18] Gideon Sjoberg, Elizabeth A. Gill and Leonard D. Cain, "Countersystem Analysis and the Construction of Alternative Futures," *Sociological Theory* 21 (2003): 210-235.

[19] George Santayana, *The Life of Reason*, Volume 1 (1905.)

[20] Provided by Kohler, Niklaus and unsourced: most likely Harold Chorney, *City of Dreams: Social Theory and the Urban Experience* (Toronto: Nelson Thomson Learning, 1990).

[21] Norbert Elias, *Time: An Essay* (Oxford: Blackwell Publishers, 1992).

[22] Maurice Halbwachs. *The Collective Memory* (New York: Harper & Row Colophon Books).

[23] Stewart Brand, *How Buildings Learn* (New York: Viking, 1994) 18-19.

[24] Stewart Brand, *How Buildings Learn* (New York: Viking, 1994).